

## CLAIMS

1. A method of forming a powder compact, which is characterized by comprising:

an application step of applying a higher fatty acid lubricant to an inner surface of a heated die; and

a compaction step of filling metal powder into said die and compacting said metal powder under such a pressure that said higher fatty acid lubricant is chemically bonded with said metal powder to form a metallic soap coating.

2. A method of forming a powder compact claimed in claim 1, wherein said higher fatty acid lubricant is a metal salt of higher fatty acid.

3. A method of forming a powder compact claimed in claim 2, wherein said metal salt of higher fatty acid is a lithium salt, a calcium salt, or a zinc salt of higher fatty acid.

4. A method of forming a powder compact claimed in claim 1, wherein said higher fatty acid lubricant is dispersed in water.

5. A method of forming a powder compact claimed in claim 4, wherein said higher fatty acid lubricant is dispersed in water containing a surfactant.

6. A method of forming a powder compact claimed in claim 5, wherein said higher fatty acid lubricant has the maximum particle diameter of less than 30  $\mu$  m.

7. A method of forming a powder compact claimed in claim 1, wherein said heated die has a temperature of 100 °C or more.

8. A method of forming a powder compact claimed in claim 7, wherein said heated die has a temperature below the melting point of said higher fatty acid lubricant.

9. A method of forming a powder compact claimed in claim 1, wherein said metal powder has been heated.

10. A method of forming a powder compact claimed in claim 1, wherein said metal powder is metal powder containing iron powder.

11. A method of forming a powder compact claimed in claim 1, wherein said metal powder contains said higher fatty acid lubricant.

12. A method of forming a powder compact claimed in claim 10, wherein said metal powder contains said higher fatty acid lubricant.

13. A method of forming a powder compact claimed in claim 11, wherein said metal powder contains not less than 0.1% by weight of said higher fatty acid lubricant.

14. A method of forming a powder compact, which is characterized by comprising:

an application step of applying a metal salt of higher fatty acid to an inner surface of a die heated to 100 °C or more; and

a compaction step of charging iron powder into said die and compacting said iron powder under not less than 600 MPa.

15. A method of forming a powder compact claimed in claim 13, wherein said metal salt of higher fatty acid is a lithium salt, a calcium salt or a zinc salt of higher fatty acid.

16. A method of forming a powder compact claimed in claim 13, wherein said iron powder is compacted under not less than 785 MPa.

17. A method of forming a powder compact, which is characterized by comprising:

an application step of applying, to an inner surface of a die which has been heated to a predetermined die temperature of 100°C or more, dispersion fluid in which a metal salt of higher fatty acid having a higher melting point than said die temperature is finely dispersed, so as to form a coating of said metal salt of said higher fatty acid;

a compaction step of filling iron powder into said die and compacting said iron powder under a compacting pressure of not less than 600 MPa so as to obtain a compact having a metallic soap coating on a surface which is in contact with said die; and

an ejecting step of ejecting and taking out said compact from said die.

18. A method of forming a powder compact, which is characterized by comprising:

an application step of applying, to an inner surface of a die

which has been heated to a predetermined die temperature of 100°C or more, dispersion fluid in which a metal salt of higher fatty acid having a higher melting point than said die temperature is finely dispersed, so as to form a coating of said metal salt of said higher fatty acid;

a compaction step of filling iron powder into said die and compacting said iron powder under a compacting pressure of not less than 600MPa so as to obtain a compact having a metallic soap coating on a surface which is in contact with said die; and

an ejecting step of ejecting and taking out said compact from said die under an ejecting pressure of not more than 3% of said compacting pressure of said compaction owing to lubricating characteristics of said metallic soap coating.

19. A method of forming a powder compact claimed in claim 16, wherein said compacting pressure is not less than 686 MPa and said ejecting pressure is not more than 8 MPa.

20. A method of forming a powder compact claimed in claim 16, wherein said compacting pressure is not less than 700 MPa and said ejecting pressure is not more than 15 MPa.

21. A method of forming a powder compact claimed in claim 16, wherein said compacting pressure is not less than 700 MPa and said ejecting pressure is not more than 13 MPa.

22. A method of forming a powder compact claimed in claim 16, wherein said compacting pressure is not less than 700 MPa and said

ejecting pressure is not more than 10 MPa.

23. A method of forming a powder compact claimed in claim 16, wherein said metal salt dispersed in said dispersion fluid has the maximum particle diameter of 30  $\mu$  m or less.

23. A method of forming a powder compact claimed in claim 16, wherein said metal salt dispersed in said dispersion fluid has the maximum particle diameter of 30  $\mu$  m or less.